

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of: MURPHY, Robert H. et al.

Group Art Unit: 2622

Serial No. 10/521,031

Examiner: NGUYEN, L. T.

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Atty Dkt No. 20020001-US

For: FRONT LENS SHUTTER MOUNT FOR UNIFORMITY CORRECTION

To: Commissioner of Patents  
Box No Fee Amendment  
Washington, D.C. 20231

Dear Commissioner:

This declaration is offered in support of the above application for patent.

RULE 132 DECLARATION OF ROBERT H. MURPHY  
(37 CFR 1.132)

**Qualifications:**

- Bachelors degree in Electrical Engineering (BSEE) from Northeastern University in Boston
- Former member of the Institute of Electrical and Electronic Engineers (IEEE)
- Member of SPIE (originally known as the Society of Photographic Instrumentation Engineers)
- Authored and co-authored more than a dozen technical papers in the IR imaging field.
- Awards in the infra-red imaging field:
  - o BAE Systems Technical Achievement award in 1997
  - o BAE Chairman's Silver Award for Innovation in 2003

I am currently a senior principle systems engineer for BAE Systems IR Imaging Systems in Lexington, Massachusetts where I began my career in 1981 after receiving a Bachelor's degree in Electrical Engineering (BSEE) from Northeastern University in Boston. I have been a member of the Institute of Electrical and Electronic Engineers (IEEE), and I am currently a member of SPIE (originally known as the Society of Photographic Instrumentation Engineers) with whom I have authored and co-authored

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Declaration of Robert H. Murphy

more than a dozen technical papers. I have received a number of awards for my work in the infrared imaging field, most notably the BAE Systems Technical Achievement award in 1997 and the Chairman's Silver Award for Innovation in 2003. I was jointly granted patent 5,763,885 entitled "Method and Apparatus for Thermal Gradient Stabilization of Uncooled Microbolometer Focal Plane Arrays from the US Patent Office in 1998.

**Remarks:**

This declaration is submitted so as to provide evidence regarding the conventional wisdom and thinking in the art of thermal imaging systems at the time the invention noted above was made, and regarding the state of knowledge in the art at that time regarding sources of background noise and sources of image distortion in thermal imaging systems.

The accepted wisdom in the art of thermal imaging system design at the time of the invention was to place the shutter adjacent to the detector array, also called the focal plane array, or "FPA." By this I mean that the shutter was positioned between the lens and the FPA, and not between the external scene and the lens. This was done for several practical reasons. It was common at that time for thermal imaging systems to be cryogenically cooled so as to suppress the internal flux of black body infra-red radiation emitted by components of the imaging system. The shutter was used mainly to provide calibration images that would correct for temperature variations, non-linearities, and other imperfections in the FPA itself, without regard to infra-red emissions by the lens, shutter, or other system components. There was typically room for the shutter to be located between the lens and the FPA, and placement of the shutter there allowed the shutter to be relatively small. Therefore, the conventional configuration of placing the shutter between the lens and the FPA made sense at the time.

However, at the time of the invention, thermal imaging systems were coming into use that did not employ cryogenic cooling, but instead relied on FPA temperature stabilization near room temperature, enhanced digital image correction enabled by advances in computing technology, and other system improvements and enhancements.

I do not know if infrared emissions from the lens and other internal components had ever been considered as a potential source of background noise and distortion. What I do know is that at the time of the invention, when non-cryogenically cooled systems were coming into use, it was not recognized by those of ordinary skill in the art that infra-red radiation emitted by an internal component, such as a lens, that was not cooled could be a significant source of image distortion and noise. Instead, the accepted wisdom in the art to place the shutter between the lens and the FPA, remained generally unquestioned.

It was also not realized at that time of the invention by those of ordinary skill in the art that infra-red radiation emitted by the shutter could be a significant source of background noise and distortion, and that the effect of shutter infra-red radiation on a thermal image could not be fully corrected by acquisition of a closed shutter reference image, since the physical configuration of the shutter is necessarily different in a closed state as compared to an open state, and thus the infra-red emission of the shutter must be different in the open and closed states.

The present invention was enabled due to the discovery of these sources of background noise by the inventors. This discovery provided an impetus to proceed against the accepted wisdom of the art and place the shutter between the lens and the scene, rather than between the lens and the FPA. By placing the shutter between the lens and the scene, typically near the entry iris of the system, infra-red emissions from the lens and other internal components are included in closed-shutter reference images, thereby enabling open-shutter images to be corrected for these background noise sources.

#### **Summary:**

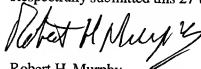
In summary, I herein declare that at the time of the invention, it was a well-established convention in the art of thermal imaging to place the shutter between the lens and the FPA. I further declare that at the time of the invention it was not generally known in the art that infra-red radiation emitted by internal components of a thermal

imaging system, notably a lens, could be a significant source of background noise and distortion in a system that was not cryogenically cooled. I also declare that it was not generally known at the time of the invention that the FPA could be sensitive to a difference in infra-red emission between an open-state shutter as compared to a closed-state shutter, and that incomplete correction of this source of background noise and distortion could thereby result.

#### **Affirmation**

The undersigned declares that all statements of his own knowledge made herein are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Respectfully submitted this 27<sup>th</sup> day of January, 2010,



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